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A population-based survey examining the awareness of factors that are associated with male infertility in the Kingdom of Saudi Arabia

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ABSTRACT

Men's knowledge of the numerous factors linked to male infertility is poor. There haven't been many research on men's awareness of their own fertility. According to research of both men and women, men are relatively less aware of issues with fertility and reproductive health. A regionally representative sample of Saudi men took part in a web-based survey on male fertility and reproductive health over the course of three months in 2022. For the study, men between the ages of 18 and 65 were enrolled. With a mean age of 24 years, there were 444 male participants. Each participant was required to list the causes of male infertility; their knowledge of fertility was evaluated by two open-ended questions and a thorough list of associated risk factors and medical conditions. By the majority of demographic factors, the general degree of fertility knowledge remained constant. The majority of men (70 percent) claimed to have some knowledge about male fertility and reproduction. Fewer men learned about fertility via television and radio than from medical professionals or the internet.

Keywords: Infertility, Fertility, Knowledge, Risk Factors, Infertility Awareness, Web-Based Survey.

1. INTRODUCTION

Given that the majority of men wish to establish children, it is imperative to increase men's awareness of the risk factors for infertility. Public health issues are raised by male infertility (Barratt et al., 2021). The social functioning, general and mental health and role performance of men can all be negatively impacted by male infertility (Chachamovich et al., 2010). Nearly 50% of diagnosed cases of infertility have male issues as the primary or contributing

reasons, such as low sperm count and poor sperm morphology (Wiser et al., 2012). Clinical recommendations advise including a reproductive history and at least one semen assay in an initial assessment of a man's fertility status (Schlegel et al., 2021), which evaluates a variety of factors including sperm motility, concentration, and morphology (Baskaran et al., 2020). Considering that most men view fatherhood as a significant component of their lives and express a desire to have children. Men should be aware of factors that may have an impact on the quality of their semen and, consequently, their fertility (Hammarberg et al., 2017).

Male infertility is linked to poor overall health; infertile men display more health issues, such as cardiovascular disease, prostate cancer, diabetes, and testicular cancer, than fertile men do (Eisenberg et al., 2016). For instance, just half of the risk factors for male infertility were, on average, recognized by participants in a study of Canadian men between the ages of 18 and 50 (Daumler et al., 2016). Infertility can lead to emotions of worthlessness and inadequacy, therefore getting reproductive advice may be perceived as damaging to a man's sense of manhood (Hanna & Gough, 2020). According to research, men have a significant influence on when a couple decides to start a family (Dudgeon and Inhorn, 2004). Therefore, there is a specific need for initiatives to increase male fertility knowledge.

Our study is one of the first to offer insight into the current status of men's fertility knowledge in the Kingdom of Saudi Arabia because it only considers men.

2. MATERIALS AND METHODS

The PSA University Ethical Committee first and foremost accepted our research Al-Kharj (SCBR-04-2022). Saudi men who met the study's inclusion requirements were subjected to a population-based survey from 20 March to 19 June 2022; participants had to be male and between the ages of 18 and 65. The survey company pilot tested the questionnaire to ensure that the items were understandable and acceptable before it was made available in Arabic. Anonymity was guaranteed to the participants, and no personally identifiable information was recorded or saved.

The study was completed by 444 men, ages 18 to 65.Regarding regional distribution, immigration status, and paternity, our questionnaire is representative of Saudi men. The research team, which included one male fertility doctor with more than 15 years of clinical experience, created the survey questions. The questionnaire started out by asking about the respondent's demographics and fertility experiences. Next, men were questioned about risk factors and health conditions related to male infertility in two open-ended questions. Respondents had the opportunity to indicate if they were unaware of any associations. Items were chosen using systematic reviews and expert judgment. Therefore, it was conceivable for males to be aware of a substance's association with infertility risk but not that of an associated health problem, or vice versa. But rather than making causative or directional assertions, this study just looked at whether males were aware of these correlations. Nine demographic factors were used in our analysis.

When necessary, two-sample t-test or ANOVA was performed to evaluate the total knowledge scores for each covariate in the univariate analysis. Using Pearson's chi-squared tests, it was determined which groups were most eager to learn about fertility. Using the stepwise Benjamini– Hochberg technique, which accounts for the false discovery rat, we adjusted for multiple comparisons (Benjamini & Hochberg, 1995). P-values were presented after running each model with robust standard errors. Stata 13.0 statistical software was used to conduct the statistical analysis.

3. RESULTS

All of the participants were adults at the time of study and inhabitants of the urban area (91.0%) of Al Kharj and the Riyadh Region. Moreover, the majority of them hold university degrees (70.7%). The majority of males (70%) said they knew a little bit, a lot, or a lot about male reproductive and fertility. The demographic characteristics of the participants were explained in table 1 and figure 1. Fertility characteristics and experiences are shown in Table 2. To the best of your knowledge, what percentages of reproductive issues are caused by male factors? Somewhat causes fertility problems was the most common response (70.5%). Regarding the sources from which the participants heard about men's fertility, Fig. 2 shows that many men learnt about fertility via medical practitioners and the internet, whereas fewer men learned about it from TV and radio.

How much you weigh each risk factor listed in table 3 that has an impact on a man's fertility. Although many risks were well known, such as diabetes (33.56%), drug use (52.03%), STIs (43.24%), and injury to the testicles or pain (39.41%), fewer men recognized the danger to fertility associated with obesity, high cholesterol, and frequent bicycling (figure 3). Medical conditions/illnesses for fertility problems are mentioned in table 4. The majority of respondents are (45.05 percent), prostate cancer (39.64 percent), and depression as the most likely (28.15 percent) (Table 4). Percentages of men who correctly named each risk factor and health problem linked to male infertility. Percentage of respondents who properly recognized the item; those who misidentified it or were unsure were categorized as not correctly identifying it (Table 5).

Table 1 Demographic characteristics

		Count	%
Age Groups	18–20 years	26	5.9%
	21–25 years	118	26.6%
	26–30 years	51	11.5%
	31–35 years	40	9.0%
	36–40 years	48	10.8%
	41–45 years	44	9.9%
	46–50 years	54	12.2%
	51 years or older	63	14.2%
Where do you live	Rural	40	9.0%
	Urban	404	91.0%
Level of education	Less than high school	6	1.4%
	Completed some high school	78	17.6%
	University graduate	314	70.7%
	Master	31	7.0%
	Ph. D	15	3.4%
Marital status	Single	189	42.6%
	Married	245	55.2%
	Other (Divorced/widowed)	10	2.3%
Do you have children	No	210	47.3%
	Yes	234	52.7%
would you like to have (more) children	Yes	326	73.4%
	No	62	14.0%
	Undecided	56	12.6%

Table 2 Fertility characteristics and experiences

		Count	%
In general, how knowledgeable you would say you are about male reproduction?	Not at all knowledgeable	60	13.5%
	Slightly knowledgeable	100	22.5%
	Somewhat knowledgeable	182	41.0%
	Very knowledgeable	72	16.2%
	Extremely knowledgeable	30	6.8%
To the best of your knowledge, to what extent do male factors contribute to fertility problems?	Does not at all cause fertility problems	44	9.9%
	Somewhat causes fertility problems	313	70.5%
	Major cause of fertility problems	87	19.6%
How concerned are you about your own fertility at this time?	Not at all concerned	253	57.0%
	Slightly concerned	109	24.5%
	Somewhat concerned	61	13.7%
	Very concerned	13	2.9%
	Extremely concerned	8	1.8%
Have you, or a partner, ever been assessed for fertility problems?	No, Not Married	176	39.6%
	Neither of us	201	45.3%
	Yes, for me	31	7.0%
	Yes, for my wife	13	2.9%
	Yes, for both of us	23	5.2%
Have you ever had any experience with	No	24	5.4%

treatment for fertility problems? This can be either personally, through a partner, or someone you know	Yes	420	94.6%
Have you ever undergone any treatment for other medical conditions/illnesses that you were told would affect your fertility?	No	427	96.2%
	Yes	17	3.8%

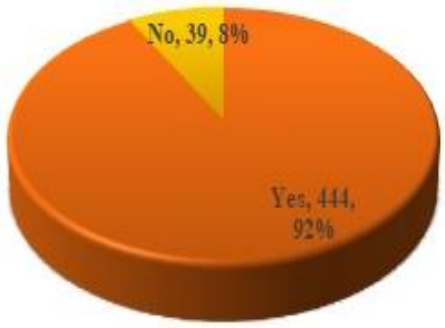

Figure 1 Participants agreed to share in the study.

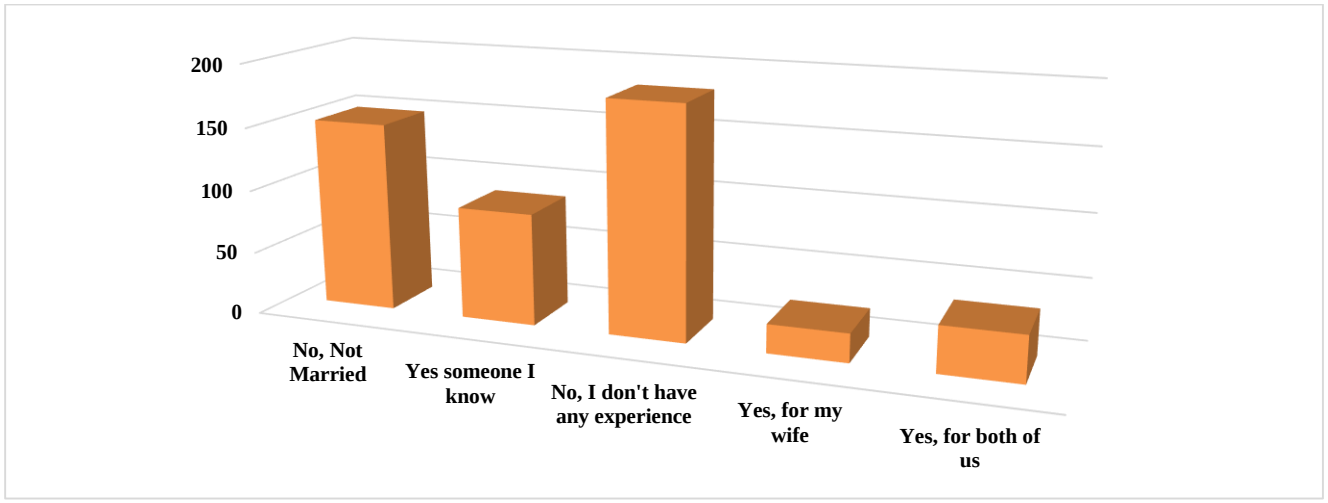

Figure 2 Experience with treatment of fertility problems.

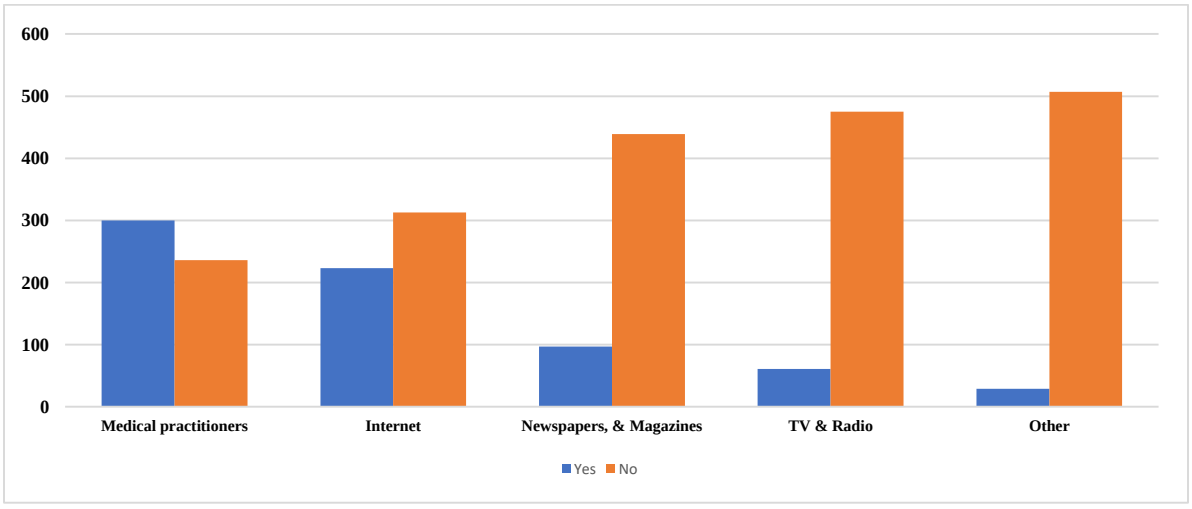

Figure 3 Sources the participants have been gained knowledge about men's fertility.

Table 3 To which extent you consider each of the following to be a factor that affects a man's fertility.

	Sure, it is not a factor	Maybe, it is not a factor	Not certain	Maybe, it is a factor	Sure, it is a factor
Age (older than 45 years)	(22.3%)	75 (16.89%)	79 (17.79%)	115 (25.9%)	76 (17.12%)
Alcohol consumption (10 drinks a week)	17 (3.83%)	37 (8.33%)	59 (13.29%)	161 (36.26%)	170 (38.29%)
Cancer treatment such as radiation or chemotherapy	6 (1.35%)	15 (3.38%)	52 (11.71%)	174 (39.19%)	197 (44.37%)
Coffee (4 cups a day)	127 (28.6%)	76 (17.12%)	143 (32.21%)	74 (16.67%)	24 (5.41%)
Dental cavity fillings	208 (46.85%)	77 (17.34%)	113 (25.45%)	32 (7.21%)	14 (3.15%)
Diabetes	26 (5.86%)	39 (8.78%)	73 (16.44%)	157 (35.36%)	149 (33.56%)
Frequent bicycling or riding horses	109 (24.55%)	60 (13.51%)	131 (29.5%)	114 (25.68%)	30 (6.76%)
Frequent hot tub use	55 (12.39%)	60 (13.51%)	107 (24.1%)	157 (35.36%)	65 (14.64%)
Frequent masturbation	48 (10.81%)	46 (10.36%)	106 (23.87%)	157 (35.36%)	87 (19.59%)
Frequent sexual relations	97 (21.85%)	79 (17.79%)	101 (22.75%)	119 (26.8%)	48 (10.81%)
Frequent use of a laptop on your lap	51 (11.49%)	47 (10.59%)	123 (27.7%)	167 (37.61%)	56 (12.61%)
Genetic abnormality	5 (1.13%)	12 (2.7%)	57 (12.84%)	185 (41.67%)	185 (41.67%)
High cholesterol	29 (6.53%)	29 (6.53%)	147 (33.11%)	177 (39.86%)	62 (13.96%)
Lack of regular exercise	51 (11.49%)	53 (11.94%)	94 (21.17%)	151 (34.01%)	95 (21.4%)
Overweight/obesity	26 (5.86%)	46 (10.36%)	65 (14.64%)	184 (41.44%)	123 (27.7%)
Pain or injury to the testicles or scrotum	2 (0.45%)	11 (2.48%)	53 (11.94%)	203 (45.72%)	175 (39.41%)
Sexually transmitted infections (e.g. chlamydia, gonorrhea, etc.)	11 (2.48%)	15 (3.38%)	54 (12.16%)	172 (38.74%)	192 (43.24%)
Size of testicles	44 (9.91%)	48 (10.81%)	139 (31.31%)	145 (32.66%)	68 (15.32%)
Smoking cigarettes	26 (5.86%)	30 (6.76%)	80 (18.02%)	179 (40.32%)	129 (29.05%)
Stress	28 (6.31%)	35 (7.88%)	88 (19.82%)	156 (35.14%)	137 (30.86%)
Use of drugs such as marijuana, narcotics, or cocaine	11 (2.48%)	18 (4.05%)	50 (11.26%)	134 (30.18%)	231 (52.03%)
Work-out supplements (such as creatine, protein, etc.)	42 (9.46%)	44 (9.91%)	140 (31.53%)	142 (31.98%)	76 (17.12%)
X-rays	19 (4.28%)	39 (8.78%)	124 (27.93%)	184 (41.44%)	17.57%)

Table 4 To which you consider men with fertility problems to be at risk of each of the following medical conditions/illnesses.

	Sure, he is not at risk	Maybe, he is not at risk	Not certain	Probably, he is at risk	Sure, he is at risk
Arthritis	111 (25%)	55 (12.39%)	225 (50.68%)	30 (6.76%)	23 (5.18%)
Being underweight	91 (20.5%)	82 (18.47%)	213 (47.97%)	37 (8.33%)	21 (4.73%)
Cardiovascular disease (heart disease, high blood pressure)	44 (9.91%)	146 (32.88%)	133 (29.95%)	43 (9.68%)	78 (17.57%)
Depression	22 (4.95%)	168 (37.84%)	94 (21.17%)	35 (7.88%)	125 (28.15%)
Diabetes	48 (10.81%)	142 (31.98%)	120 (27.03%)	34 (7.66%)	100 (22.52%)
Fever	84 (18.92%)	109 (24.55%)	169 (38.06%)	27 (6.08%)	55 (12.39%)
Insomnia	48 (10.81%)	139 (31.31%)	173 (38.96%)	27 (6.08%)	57 (12.84%)
Obesity	38 (8.56%)	146 (32.88%)	125 (28.15%)	38 (8.56%)	97 (21.85%)
Prostate cancer	17 (3.83%)	138 (31.08%)	95 (21.4%)	18 (4.05%)	176 (39.64%)
Sexually transmitted infections	30 (6.76%)	98 (22.07%)	92 (20.72%)	24 (5.41%)	200 (45.05%)

Table 5 Percentage of males that clearly predicted each risk factor and condition linked to male infertility

	No. (%)
A component relevant to male infertility	
Age (more than 45 years)	191 (43.02%)
Alcohol consumption (10 drinks a week)	331 (74.55%)
Chemotherapy or radiation therapy for cancer	371 (83.56%)
Coffee (4 cups a day)	98 (22.07%)
Dental cavity fillings	46 (10.36%)
Diabetes	306 (68.92%)
Riding horses or Frequent bicycling	144 (32.43%)
Frequent hot tub use	222 (50%)
Frequent masturbation	244 (54.95%)
Frequent sexual relations	167 (37.61%)
Using a laptop on your lap a lot	223 (50.23%)
Genetic abnormality	370 (83.33%)
High cholesterol	239 (53.83%)
Lack of regular exercise	246 (55.41%)
Overweight/obesity	307 (69.14%)
injury to the testicles or Pain	378 (85.14%)
Sexually transmitted infections (e.g. chlamydia, gonorrhea, etc.)	364 (81.98%)
Size of testicles	213 (47.97%)
Smoking cigarettes	308 (69.37%)
Stress	293 (65.99%)
Using medications like narcotics, marijuana, or cocaine	365 (82.21%)
Exercise supplements (such as creatine, protein, etc.)	218 (49.1%)
X-rays	262 (59.01%)
Additional health problems that infertile men are more susceptible to	
Arthritis	53 (11.94%)
Being underweight	58 (13.06%)
Cardio-vascular disease (high blood pressure,heart disease)	121 (27.25%)
Depression	160 (36.04%)
Diabetes	134 (30.18%)
Fever	82 (18.47%)
Insomnia	84 (18.92%)
Obesity	135 (30.41%)
Prostate cancer	194 (43.69%)
Sexually transmitted infections	224 (50.45%)
Testicular cancer	240 (54.05%)

4. DISCUSSION

As far as we know, this work is the first comprehensive survey that focuses entirely on men's awareness of male fertility in Saudi Arabia and asks questions about risk factors as well as health problems associated with male infertility. Our research demonstrates that Saudi men's conception of their own fertility was lacking. It is also revealed that men's understanding of fertility was consistent across the majority of demographic groupings. The majority of males wanted to know more about how their reproductive systems worked. Therefore, if people are better knowledgeable about fertility, they are more likely to adopt healthy habits to boost their own fertility. Given that men's preferences influence when it comes to a couple's decision to have children, it is crucial to comprehend men's opinions (Dudgeon & Inhorn, 2004). Evidence reveals knowledge gaps regarding male fertility (Hammarberg et al., 2017; Pedro et al., 2018) in line with earlier research and analysis on how men and women view awareness of fertility (Hviid Malling et al., 2020; Boivin et al., 2018). The young males in this survey thought that sexual education curricula in primary and secondary schools should include information on fertility. In order to encourage educated fertility decision-making and avoid infertility on an individual level, multiple measures at various stages of life are required. Other scholars have emphasized the necessity of imparting pertinent knowledge at suitable ages (Vassard et al., 2016; Sylvest et al., 2018).

The results cannot be extended to all men in a similar age group because recruitment difficulties led to all of the participants being highly educated, despite the researchers' objective to examine opinions across diverse educational backgrounds. Our study is one of the first to offer insight into the current status of men's fertility knowledge because it only considers men. We detected distinct knowledge deficits in the general public, albeit more research is needed to substantiate these findings.

5. CONCLUSION

Our findings demonstrate how men like to receive information. By having more information about fertility, an individual can improve overall health through early detection of related medical disorders and reduce the likelihood of infertility and the associated physical, psychological and financial costs.

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Authors' Contributions

All authors contributed to the research and/or preparation of the manuscript. Mosab A. A Alzubier (https://orcid.org/0000-0003-0750-6306) and Abdullah Ahmad A Twair participated in the study design and wrote the first draft of the manuscript. Alhaytham M Z Almuaddi, Abdullah Zaid J Alnefea collected and processed the samples. Abdulaziz Fahad A Salamh, Abdulhakim Alqahtani, Nawaf Ali S Alqahtani and Ali Hassan A. Aliparticipated in the study design and performed the statistical analyses. All of the authors read and approved the final manuscript.

Ethics Approval

All series of steps that were implemented in this study that included animal models were in compliance with Ethics Committee of Prince Sattam bin Abdulaziz University Institutional Review Board (SCBR-04-2022).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Barratt CL, De Jonge CJ, Anderson RA, Eisenberg M L, Garrido N, Rautakallio HS, Krausz C, Kimmins SO, Bryan MK, Pacey AA, Tüttelmann F, Veltman JA. A global approach to addressing the policy, research and social

challenges of male reproductive health. Hum Reprod Open 2021; 2021(1): hoab009.
2. Baskaran S, Finelli R, Agarwal A, Henkel R. Diagnostic value of routine semen analysis in clinical andrology. Andrologia 2021; 53(2): e13614. doi. org/10.1111/and.13614.
3. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. J R Stat Soc 1995; 57:289–300.
4. Boivin J, Koert E, Harris T, O, Shea L, Perryman A, Parker K, Harrison C. An experimental evaluation of the benefits and costs of providing fertility information to adolescents and emerging adults. Hum Reprod 2018; 33(7):1247-1253. doi: 10.1093/humrep/dey107.
5. Chachamovich JR, Chachamovich E, Ezer H, Fleck MP, Knauth D, Passos EP. Investigating quality of life and health-related quality of life in infertility: a systematic review. J Psychosom Obstet Gynaecol 2010; 31(2):101-10.
6. Daumler D, Chan P, Lo K, Takefman J, Zelkowitz P. Men's knowledge of their own fertility: A population-based survey examining the awareness of factors that are associated with male infertility. Hum Reprod 2016; 31(12):2781-2790.
7. Dudgeon MR, Inhorn MC. Men's influences on women's reproductive health: medical anthropological perspectives. Soc Sci Med 2004; 59(7): 1379-95.
8. Eisenberg ML, Shufeng L, Cullen MR, Baker LC. Increased risk of incident chronic medical conditions in infertile men: analysis of United States claims data. Fertil Steril 2016; 105(3):629-636. doi: 10.1016/j.fertnstert.2015.11.011.
9. Hammarberg K, Collins V, Holden C, Young K, McLachlan R. Men's knowledge, attitudes and behaviours relating to fertility. Hum Reprod Update 2017; 23(4):458-480. doi: 10.1093/humupd/dmx005.
10. Hanna E, Gough B. The social construction of male infertility: A qualitative questionnaire study of men with a male factor infertility diagnosis. Sociol Health Illn 2020; 42(3): 465-480. doi: 10.1111/1467-9566.13038.
11. Hviid Malling GM, Schmidt L, Pitsillos T, Hammarberg K, Tyde´n T, Friberg B, Jensen I, Ziebe S. Taking fertility for granted – a qualitative exploration of fertility awareness among young, childless men in Denmark and Sweden. Hum Fertil 2020; 1-12.
12. Pedro J, Brandao T, Schmidt L, Costa ME, Martins MV. What do people know about fertility? A systematic review on fertility awareness and its associated factors. Ups J Med Sci 2018; 123(2): 71-81. doi: 10.1080/03009734.2018.1480186.
13. Schlegel PN, Sigman M, Collura B, De Jonge CJ, Eisenberg ML, Lamb DJ, Mulhall JP, Niederberger C, Sandlow JI, Sokol RZ, Spandorfer SD, Tanrikut C, Treadwell JR, Oristaglio JT, Zini A. Diagnosis and treatment of infertility in men: AUA/ASRM guideline part I. Fertil Steril 2021; 115(1): 54-61. doi: 10.1016/j.fertnstert.2020.11.015.
14. Sylvest R, Koert E, Vittrup I, Birch Petersen K, Hvidman HW, Hald F, Schmidt L. Men's expectations and experiences of fertility awareness assessment and counseling. Acta Obstet Gynecol Scand 2018; 97(12): 1471-1477. doi: 10.1111/aogs.13449.
15. Vassard D, Lallemant C, Nyboe Andersen A, Macklon N, Schmidt L. A population-based survey on family intentions and fertility awareness in women and men in the United Kingdom and Denmark. Ups J Med Sci 2016; 121(4): 244-251. doi: 10.1080/03009734.2016.1194503.
16. Wiser HJ, Sandlow J, Köhler TS. Causes of male infertility. In: Parekattil JS, Agarwal A (eds). Male Infertility: Contemporary Clinical Approaches, Andrology, ART & Antioxidants. New York: Springer New York, 2012:3–14.